

First of a Series on
LIFE IN THE POLAR REGIONS

ARCTIC GEOGRAPHY

by

DOLLA COX WEAVER

Raymond Foundation



Museum Stories, Number 253

October 3, 1953

Arctic Geography

The north-polar ocean, called the Arctic Ocean, lies in a great basin surrounded by continents. Much of the basin is about two miles deep and most of it is covered with a layer of ice 7 to 12 feet thick. A large part of this vast "island" of ice is always there, even in the warmest months of the arctic summer. Since polar ice is actually frozen sea-water, it contains varying amounts of salt. Ocean currents and winds move large pieces of polar ice up against one another and form pressure ridges, great piles of ice 50 to 100 feet high. During the summer months the outer edges of this ice "island" break off and are carried away to the south by wind and ocean currents. This type of ice is called floe by explorers. Heaped-up ice floes form floebergs that look like icebergs, but true icebergs are never found in the Arctic Ocean. We must travel to seas surrounding Greenland to see them.

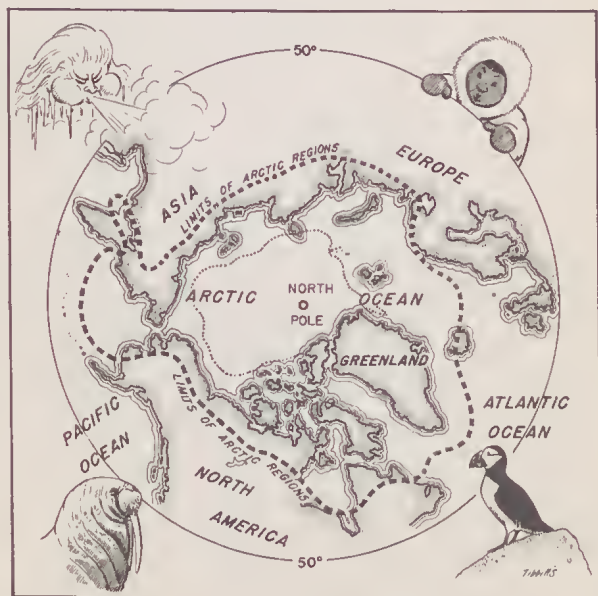
Greenland, with an area more than three times the size of Texas, is the largest of the arctic lands. It is covered almost completely with an ice-sheet that is thought to be several thousand feet in thickness. The east and west coasts are bordered with steep mountains, and great rivers of ice called glaciers flow down the valleys of these mountains to the sea, where they break off to form icebergs. Arctic icebergs are huge irregularly shaped masses of ice that resemble floating castles. Icebergs are formed by glaciers and so they are made of packed snow, but sea-ice is formed by the freezing of sea-water and is salty. However, old sea-ice may become fresh by the gradual settling of salts to the bottom, and many explorers have used melted sea-ice as drinking water. We see only a small portion of an iceberg because five-sixths of it is beneath the water. If any of these icebergs float southward into the Atlantic shipping lanes, the dangerous ones are dynamited by the International Ice Patrol.

Now let us visit Alaska. First we notice on our map that only the northern part of Alaska is included in the Arctic Regions. The snow-covered mountains in this part

of Alaska, called the Brooks Range, are rarely visited by anyone except a few prospectors who hope to "strike it rich." As we move east along the Canadian coast we see a great mass of islands called the Arctic Archipelago. During the Ice Age great sheets of ice moved over many of these islands, rounding off the hills and scraping away the soil-covering. Today most of these islands do not have permanent ice fields. However both Baffin Island and Ellesmere Island have high rugged mountains that contain glaciers and ice-sheets. Then south of the Arctic Archipelago on the mainland of northern Canada we find the bleak, desolate Barren Grounds. The higher areas are exposed bedrock surfaces, but thousands of lakes, swamps, and boulders cover the lower areas.

Parts of the European and Soviet Arctic Regions are low, flat tundra plains that resemble the Canadian Barren Grounds. Notice on our map of the Arctic how few islands there are along the European and Soviet mainland. The Siberian ports are open only two months of the year because ships are unable to sail through the heavy pack-ice.

ARCTIC REGIONS



This page is for your own notes and illustrations

Second of a Series on
LIFE IN THE POLAR REGIONS

ANTARCTIC GEOGRAPHY

by

DOLLA COX WEAVER

Raymond Foundation



Museum Stories, Number 254

October 10, 1953

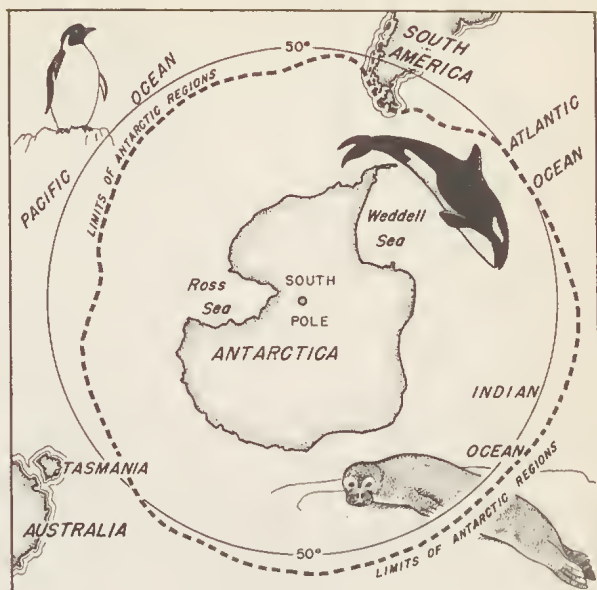
Antarctic Geography

We have learned that the north-polar region is made up of a large ocean surrounded by continents. In striking contrast, the south-polar region consists of a huge continent (almost twice the size of the United States) entirely surrounded by oceans. The continent Antarctica has been compared to an inverted bowl of ice with the snowy tops of great mountain ranges rising above its icy surface. This great ice-sheet is believed to be about two thousand feet in thickness. It covers the continent completely and flows into the sea as great tongues of ice. One of the great tongues, called Ross Shelf Ice, is twice the size of the state of Illinois. The shelf ice breaks off into huge flat block-like icebergs that are hundreds of times larger than Chicago Natural History Museum. Being block-like, the antarctic icebergs differ markedly in appearance from the fairyland-castle icebergs of Greenland.

The continent Antarctica is rimmed by a belt of pack-ice that extends outward seventy to three hundred miles. During the antarctic summer month of December great zigzagging cracks form in the pack-ice, breaking up the ice so that ships are able to move through it to the coast line. In July and August the antarctic winter suddenly freezes the chunks of pack-ice into a solid mass again. Winter in the Antarctic is much more intense than in the Arctic—the temperatures drop lower, there is more snow and ice, and the blizzards are more violent. Antarctica is indeed the coldest place on earth.

We have already learned that Antarctica has many mountains that lift their jagged peaks above the ice-sheet. Many of these mountains are as high as our own Rocky Mountains. Geologists believe that these great mountains are a southward extension of the Rocky and Andes mountain-systems. Some of the great mountains are dead volcanoes. However, one, Mt. Erebus on Ross Island, is active and constantly belching forth great black clouds of volcanic dust and large columns of steam. The surrounding countryside is heavy with the odor of sulphureous fumes.

ANTARCTIC REGIONS



Recently pilots have reported "ice-free" areas of brown-rock hills with blue and green lakes in the valleys, several of which cover more than three hundred square miles. Some scientists believe that there may be underground heat, as in the hot-spring region of Yellowstone National Park, to cause these "ice-free" areas. Others think that the prevailing winds might sweep away the snow as soon as it falls. Still others believe that this area represents a moraine—a great ridge of boulders and rocks dumped at the edge of the ice-river as it flowed down to the sea.

One of the interesting facts observed in the Antarctic is the exceedingly slow rate at which decay and rust proceed. In 1947, Admiral Richard E. Byrd ate canned meat and biscuits found in a camp used thirty-five years before by Captain Robert F. Scott. There are no bacteria to cause spoilage because the temperature seldom rises above 32 degrees and is believed to fall as low as 100 degrees below zero. Several explorers have suggested that the Antarctic be used as a giant icebox to store surplus crops of wheat and potatoes from abundant harvests.

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Third of a Series on
LIFE IN THE POLAR REGIONS

POLAR PLANTS

by

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Raymond Foundation



Museum Stories, Number 255

October 17, 1953

Polar Plants

The Arctic or the north-polar region is not completely without plant-life as many people think. True, no plants grow on icecaps or glaciers, but there are spots where plants grow luxuriantly. Great stretches of treeless land called tundra are characteristic of this region. Tundra looks like the prairies of our Middle West except that tundra is poorly drained and is therefore marshy. Also, tundra is permanently frozen a few feet below the surface. During the short summer the ground thaws one to two feet below the surface, but water cannot sink below the thawed layer because of the frozen ground underneath.

Lichens, grasses, and sedges (grass-like plants) and several kinds of shrubs are the most common plants found in the arctic tundra, but in the wet places mosses grow better than flowering plants. In the far north any land that is free of snow and ice for even a few weeks during the year will support some kind of plant life. Flowers seldom grow on bare, rocky, and sandy ridges. Dark "rock tripe" lichens cover rock surfaces, and the tops of most ridges are covered with reindeer lichens. For a short time each summer blue, yellow, and purple flowers brighten the dull-green landscape. During the rest of the year the tundra presents a dull, desolate appearance.

Arctic plants must complete their life cycles in the short summer, which starts about the end of June and ends about mid-August. Many times flower buds open before the snow is off the ground. Blooming is almost explosive. Flowers are brightly colored but have little or no scent. Arctic plants have successfully adapted themselves to the harsh conditions under which they live and thrive. Bitter cold, drought (surprisingly little snow falls), frozen



ground, and very strong winds all have a drying effect on plants. During the short period of growth, however, an average summer temperature of 50 degrees and prolonged sunlight prove advantageous. The temperature of and near the ground is considerably higher than that of the air. For these reasons most arctic plants are small but sturdy and have small leathery leaves and hair-like coverings. Tall trees are not found in the Arctic, but dwarf trees are abundant in sheltered areas.

In the Antarctic or south-polar region, plant-life is found only on the edges of the continent, on mountain sides, and on the islands just off the coast. Most of the antarctic continent is covered with a tremendous ice-sheet on which no plants, except possibly algae, grow.

Mosses and lichens are the characteristic plants of the Antarctic. Even in midwinter, cliffs appear gray or orange because of their thick covering of lichens. Although all antarctic mosses are frozen from eight to eleven months of the year, they are still able to grow.

The absence of ferns and flowering plants in the Antarctic is mostly the result of the shortness of summer and extremely low temperatures. There is no real summer because at no time during the year is the average temperature above freezing. Unlike the north-polar region, where the summer months are June through August, summer in the south-polar region is from December through February. Actually, the vegetation is exposed to sunlight for only four to six weeks every year. The ground thaws to a depth of a few inches only on a few sunny days about midsummer, and even then it is saturated with ice-cold water.

Thus it is impossible for plants, other than lichens and mosses, to complete their life cycles. No flowering plant would be able to reach the flowering state and mature its seeds. Cold drying winds also stop plant growth. Besides climatic factors, the plant-life of the Antarctic is exposed to another enemy—the penguin. In the spring and summer thousands of penguins occupy every spot that might be favorable for plants. Therefore any plant growing in a penguin rookery would be unlikely to survive.

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Fourth of a Series on
LIFE IN THE POLAR REGIONS

ARCTIC COASTAL ANIMALS

by

NANCY WORSHAM

Raymond Foundation



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Arctic Coastal Animals

Many arctic animals can live only in the coastal areas, where sea waters contain numerous tiny animals that, with microscopic plants, are referred to as plankton. In summer the plankton becomes so dense that the water is often colored red by it. This seasonal food-supply attracts many fishes, birds, and mammals, and they in turn attract their own predators. But in winter all coastal birds and many of the mammals escape the bitter weather by migrating to warmer areas. Even those animals able to withstand the cold often move southward to find food.

Most coastal birds have long powerful wings that enable them to fly great distances. They are equipped with bills suitable for eating fish, and most of the birds have webbed feet. Oily feathers prevent these birds from becoming waterlogged when resting on the waves.

While they are in the far north these birds raise their young, crowding together on cliffs or islets. Murres, auks, kittiwakes, and gulls or eider ducks, knots, godwits, turnstones, and curlews may all be found nesting within a few feet of each other. The parents must make many trips to the water to get food for their rapidly growing fledglings. Jaegers and skuas, the arctic pirates, will dive at another bird that has a fish rather than hunt their own food. When the frightened fisherman drops his prey, the pirate snatches it in mid-air and flies off with its meal.

The mammals also are well adapted to finding their food in the water. The whale, walrus, seal, and sea lion have flippers, transformed from legs, to aid in swimming, and the polar bear is more streamlined than its inland cousins. All these animals are protected from the icy water by an insulating layer of fat, called blubber, just beneath the skin and by oily, thick, fur coats or tough hides.

Whales have become so extremely modified for life in the water that they are unable to live more than a few hours when stranded ashore by tides or storms. Their young are even born in the water. Though baleen whales are the world's largest animals, they live on small fishes

and plankton and have a sort of built-in sieve to strain material from the water. Kittiwakes often follow baleen whales to eat their leftovers.

The walrus uses its long ivory tusks to dig clams from the muddy ocean floor. It also uses them for self-defense and as ice picks to haul its heavy bulk out of the water and across the frozen ground.

Many mammals, like the birds, gather in colonies in the summer. There are only three islands in the world where fur seals breed. The large fat bulls come ashore first to establish home areas that no other bull dares enter. In a couple of weeks each bull is joined by his many wives whom he guards jealously. While the pups are being raised, the bulls never leave their territory, even to eat. They depend on the fat stored in their bodies. The young bulls, excluded from the main colony, spend the summer on nearby rocks. The more solitary spotted harbor or hair seal does not follow such a definite pattern. It often stays in the far north all winter.

Arctic animals are able to get along under extremely difficult conditions of both climate and food-supply because of their special body-structures and habits.



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Fifth of a Series on
LIFE IN THE POLAR REGIONS

TUNDRA ANIMALS

by

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Raymond Foundation



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Tundra Animals

Tundra animals include many, many insects, a variety of birds, and a few mammals. The long summer days are warm enough for insects with rapid development to live in large numbers. Flies are the most abundant. Mosquitoes are next. The entire tundra marsh is a breeding place for their larvae. The pollen-feeding insects—bees, wasps, moths, and butterflies—appear as the tundra flowers bloom. On the snow banks early in the spring there are countless tiny wingless insects called springtails or snow fleas. In the winter all arctic insects die or become inactive, surviving mostly in the egg stage.

Many tundra birds—ducks, geese, cranes, swans, loons, plovers, and phalaropes—are really marsh or lake birds that seek the secluded tundra marshes to raise their young. Some winter in marshes of Texas and Louisiana; others go farther south. The arctic tern even gets to the south-polar region. We see it only during its migrations.

Although most tundra birds depend on trips to water for food, the ptarmigan, which is an exception, lives in the far north during the entire year. It has a winter coat of pure-white feathers, which it changes in the spring for its mottled-brown plumage. In extremely bitter weather the ptarmigan burrows into a snowdrift, and, like the snowy owl, its feet are completely feathered for warmth. Snowy owls stay in the north as long as their food-supply is sufficient, but when the lemming population is low, these owls may be seen as far south as Chicago.



Like the arctic coastal animals, the land animals have thick coats and layers of fat for warmth. Arctic hares and arctic foxes, as well as the coastal polar bear, have hair on the bottoms of their feet to keep them from freezing and to give better footing on ice. Most arctic animals have short stocky legs, short tails, and small ears to prevent frostbite. Musk oxen and lemmings are both good examples of this. Many polar animals are light-colored, particularly in the winter.

Caribou and their Old World cousins, the reindeer, differ from other deer in that their muzzles are completely covered with hair and the females as well as the males have antlers. In winter some of these animals move southward, often seeking the shelter of forests south of the tundra. The caribou has not been successfully domesticated, but the reindeer has been raised in Europe and Asia for fur, hides, meat, and milk and as a beast of burden. The reindeer was introduced into North America a little more than fifty years ago for the use of the Eskimos.

Wolves hunt in groups because a pack of wolves can kill larger animals than a lone wolf can. Caribou and reindeer escape these packs by running away from them. Musk oxen stubbornly stand their ground in a tight circle with their horns pointing toward their attackers. Their shaggy coats are also a protection.

The most abundant arctic mammal is the lemming, a fluffy rodent that lives in tundra burrows. The collared lemming grows a white winter coat like its chief enemies, the owl and the arctic fox. These little mouse-like rodents fall prey to nearly all other arctic animals. Even the caribou, which normally eats reindeer moss and other tundra plants, will eat a lemming that gets in its way. With every other animal hunting them, lemmings soon would disappear except that a mother lemming has five or six litters a year with five or six babies in a litter. At this rate, about every four years lemmings become so abundant that they eat all the food in the Arctic and must migrate or die of starvation. With both plant-food and lemmings gone, all the other animals must also move southward for food.

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Sixth of a Series on
LIFE IN THE POLAR REGIONS

ANTARCTIC ANIMALS

by

NANCY WORSHAM

Raymond Foundation



Museum Stories, Number 258

November 7, 1953

Antarctic Animals

Animal life on the antarctic continent is scarce and limited to coastal areas. The most conspicuous residents are the penguins, flightless swimming-birds. Because of their upright posture, the resemblance of their plumage to men's full-dress suits, and a seeming air of near-sighted dignity, penguins have a man-like appearance. They live in large groups nesting near the shore.

Of the more than a dozen kinds, the emperors, standing about five feet high, are the largest. Their eggs are laid one at a time during the antarctic winter night and are held on their feet next to the body for warmth. Eggs are transferred from one bird to another periodically so that the parents can get food and exercise. The brooding instinct is so strong that all the penguins in the area without eggs rush over to gain possession. In the confusion of this exchange the egg is sometimes broken. Occasionally penguins without eggs will try to incubate egg-shaped chunks of ice or snowballs.

Young penguins are awkward, helpless, and down-covered. Adelie penguin chicks stay in groups of as many as twenty birds while the adults work in shifts caring for them. This baby-sitter or nursery-school care lasts longer for penguins than parental care for most birds.

Fishes are the main food of penguins; so these birds must be excellent swimmers. Their wings have become more like the flippers of seals than bird wings. Penguins swim with such force that even a large emperor is able literally to shoot out of the water and land on its feet. When not busy with family responsibilities, penguins spend



a great deal of time just enjoying themselves. Some are fond of sliding headfirst down icy slopes, while others prefer to take "joy rides" on ice floes.

The chief enemy of the penguin is the huge leopard seal that inhabits the same region. The only mammal on the continent, this giant seal commonly grows to be ten feet long, nearly twice the size of its arctic cousins. It gets its name from its leopard-like spots, but its name also fits its disposition. These seals eat penguins or any other birds they happen to find in the water. Since they eat so many birds, it is strange that they are not able to digest feathers. Seals sometimes roll on the bank in the apparent agony of a stomach-ache until they finally disgorge a ball of packed feathers.

Other antarctic birds are gulls, terns, petrels, skuas, and shearwaters. Some live in colonies, but shearwaters and petrels dig secluded burrows in which to raise their young. When the nesting season is over, their powerful wings carry these birds far out to sea. They are so at home on water that they even sleep floating on waves. They touch land only when they are nesting. Sheathbills, like penguins, are limited to the Southern Hemisphere.

The few insects and mites that live in the south-polar region are found around the penguin rookeries. There are no flying insects. There are only springtails and wingless flies, and these are of very little importance in the lives of antarctic animals.

Plankton—tiny plants and animals—in antarctic waters provides food for fishes, water birds, and whales. The fishes and birds in turn are the food of the land animals. So there could be no antarctic life without plankton.



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Seventh of a Series on
LIFE IN THE POLAR REGIONS

HUNTERS OF THE ARCTIC

by

EDITH FLEMING

Raymond Foundation



Museum Stories, Number 259

November 14, 1953

Hunters of the Arctic

Far north, beyond the tree line, along the arctic shores of North America, live the Central Eskimos. In this cold and barren country where few plants can grow, people must be very clever to eke out a living. In winter the Eskimo men hunt the seals that give them their food, clothing, tools, and even fuel. Winter life revolves around seal-hunting. Sometimes the houses are built on the ice close to the seals' breathing-holes so that no time will be lost going to and from the hunt in the short arctic day.

The Eskimos make use of everything in their environment, even the snow, which they make into their winter homes. Without any measuring tools the men cut the snow blocks so evenly and put them together with such care that the last block fits into the roof as neatly as a cork into a bottle. A passageway into the hut is dug lower than the main house to keep a draft from blowing along the floor, and here in bad weather the dogs find shelter.

Two families usually share the one-room house, each family keeping its cooking pot and stone lamp on its own side of the room. The lamps burn seal blubber and are the only means of heating the house and cooking the food. On the snow ledge at the back of the house are the sleeping quarters, where long poles with paddles for crosspieces are covered with shrubs and caribou skins to protect the sleepers from the cold snow ledge.

The harbor or spotted seals that the Eskimos hunt live under the ice near the shore, but they have to come to the surface to breathe, and so each seal has several breathing-holes. Though the Eskimos cannot see the holes through



the snow, the dogs can smell them. As soon as the dogs have found a hole, the hunter puts a bone pointer over the center of it and waits, sometimes for several hours in the cold, until the seal comes. It is



easy to understand why the Eskimos call this kind of hunting "he waits." At last the pointer moves as the seal raises its head to get a breath. The hunter strikes with his harpoon. After the seal has been killed it is lashed securely to the dog sledge. Now the dogs are harnessed, each one with a separate trace so that the leader runs first and the others fan out behind. Yapping and baying, they pull the sledge, each one picking its way over the ice while the hunter shouts encouragement and directions.

Eskimo dogs are fierce and there are many fights, especially if there is a new dog added to the team. The old dogs resent the newcomer, and the new dog refuses to work until he recognizes the leader. This leader, the strongest dog, demands obedience from the others, eats first, and has the choice of the best food. Because the dogs are so important to the Eskimos they are fairly well treated and in times of plenty are fed every other day. Perhaps the dogs realize they are important too, for there are certain things they will not allow. For instance, on a long dog-sledge trip they refuse to let the men talk. If the dogs hear conversation, they stop, turn around, sit down, and listen until the men are quiet. Often dogs can find their way in the northern storms where humans cannot, and many men have owed their lives to their dog teams.

Winter life with the Eskimos is hard. The intense cold, the fierce winds, the dangers of the hunt, and the fear of starvation hang over them. In spite of this, they have learned to live as comfortably as possible in this bleak country, and explorers in the north have found the Eskimo way of living the best in this forbidding land.

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Eighth of a Series on
LIFE IN THE POLAR REGIONS

SUMMER LIFE OF THE CENTRAL ESKIMOS

by

EDITH FLEMING

Raymond Foundation



Museum Stories, Number 260

November 21, 1953

Summer Life of the Central Eskimos

Unlike the people we know who take their vacations in the summer, the Eskimos usually go visiting in the spring when the days are growing longer but the snow is still firm enough for easy travel by dog sledge. Sometimes Eskimos will travel long distances, even four or five hundred miles, to see friends or relatives. Of course, because they go so far it is necessary for them to stay a long time to make the trip worth while. So the visitors build a house next door to their friends and settle down for a year, returning home the following spring.

The life of the Eskimos in summer is quite different from their life in winter when they live in snowhouses near the seals' breathing-holes. As the weather grows warmer, the roofs of the snowhouses melt and cave in, and then the Eskimos fasten a skin roof over the snow walls. Still later they move into tents made from sealskin or caribou hide. In the summer the Eskimos turn away from the sea to fishing in the rivers or hunting the land animals.

When the ice begins to break up in the rivers, the salmon swim upstream in the free water between the ice floes, coming in such numbers that they seem to fill the entire stream. The Eskimos are ready for them, a whole camp waiting on the bank. The men spear the fish with six-foot fish spears on the end of which are three prongs that lift the fish out of the water. While the salmon are "running," the men work very hard, and when the ice has melted they even leap into the water in their haste to spear as many fish as possible. It is a time of great activity.

When the snow has melted and the short summer is at hand, the Eskimos move up the valleys to hunt caribou, the American reindeer. These animals move in great herds, making it easy for groups of Eskimos to hunt them. So people who have been scattered in spring come together now for the caribou hunt. Often the Eskimos drive a herd into the water where hunters in kayaks dart in and out spearing the animals. Or they may drive the caribou into a narrow valley where the hunters can shoot them at close range.

Sometimes when hunting on the plains where there is no cover, two men dressed in skins will try to imitate a caribou by walking close together. One man moves forward with the guns or bows held high over his head to look like antlers; the other follows close behind, bending forward to form the back and hind legs of the animal. If the caribou seem suspicious of this strange animal, the first man will crouch, the second lie flat until the caribou go back to grazing. Then the men creep forward again until they are close enough to shoot with careful aim.

Only the summer hide of the caribou is suitable to be used for clothing. It is the women's work to make the skins into the men's winter hunting-clothes, the bedding, and the tent covering for the summer shelter.

Besides hunting caribou, the Eskimos trap the smaller animals, such as wolves and hares. Thousands of geese, ducks, and other birds migrate to the tundra in the short summer, and the hunters set snares for them. Sometimes the Eskimos hunt the birds with light spears shot with spear throwers that increase the range of the weapon. In the molting season the waterfowl are unable to fly and are an easy prey to the hunters who pursue them in kayaks.

In the brief warm summer the vegetation sprouts rapidly. Roots and berries ripen, and the women gather them as luxuries. But they do not form an important part of the diet. The real food-supply is meat and fat from animals the men hunt.

All summer long the Eskimos toil collecting their winter food-supply. With the fall they return to the coast for a time of enforced idleness when the caribou are not near the shore and the ice is not hard enough for the seal hunt. This is a time of feasting and festival that lasts into December, a time to be remembered in the dark cold winter that lies ahead.



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Ninth of a Series on
LIFE IN THE POLAR REGIONS

REINDEER PEOPLE OF SIBERIA

by

HARRIET SMITH

Raymond Foundation



Museum Stories, Number 261

November 28, 1953



Reindeer People of Siberia

All across the top of the Old World, from Finland to the Bering Sea, roam nomad tribes whose lives depend on the reindeer. Their whole pattern of living is controlled by the habits of these northland animals. In summer reindeer herds move out onto the swampy tundra, where reindeer moss is plentiful and where they can escape the torment of mosquito swarms along the forest border. But in winter the herds migrate back to the shelter of the trees, where the reindeer can reach patches of moss by digging with sharp hooves in the shallower snow of sheltered spots.

Siberian natives look and dress and live very much as Eskimos do. Many are hunters too, but they hunt the game of our Ice Age ancestors—the reindeer; and they hunt them all year long instead of only in summer as the Eskimos hunt caribou, the American reindeer. However, many Siberian tribes have tamed these animals that are so well adapted for life in the far north, where horses and cattle cannot live. Some keep big herds of reindeer either for meat or milk, just as if they were cattle, while others keep only a few tame deer to use as horses. Some ride deer and use them as pack animals and others hitch them up to pull sledges. Like the buffalo-hunters of our own western plains, the Reindeer People—both hunters and herdsmen—must follow the animals on which they depend for clothing, food, and shelter. Their life is one long camping trip: out onto the tundra in summer, back into the shelter of the forest border in winter.

Long ago the Tungus tribes were all nomad horsemen on the plains of central Asia. One branch, the Manchu, raided China and became the rulers of that great empire. Other

Tungus bands were forced so far northward that their horses couldn't find grass for food, nor could they travel on the soggy tundra in summer or through the snow in winter. These displaced people, now the northern Tungus, saw that neighboring tribes had trained reindeer to draw sleds, copying the way Siberian Eskimos use dog teams. And so the Tungus substituted reindeer for the horses they had depended on to ride and use as pack animals.

But a reindeer hasn't as strong a back as that of a horse. However, it can carry two hundred pounds in saddlebags slung over its strong shoulders. Since a rider too must sit on the deer's shoulders, the rear prongs of its antlers are usually sawed short to keep them from scratching the rider off. Whenever the families move camp to follow the wild herds on their migrations, pack deer carry all the camping equipment and the smaller children. While the women take care of the small herds of tame reindeer, their husbands and older sons ride out to hunt the wild herds, which supply meat for food and warm skins for clothing and tent covers.

A reindeer can be tamed to help people, but it doesn't fit the usual description of a domestic animal. "Domesticated" means kept near at home; yet reindeer keepers must move their own homes to suit the habits of their animals. Domestic animals are usually given food, shelter, and protection in return for their services to man. But the only benefits tamed reindeer get out of their partnership with people are really just luxuries—salt, for which even the wild reindeer will risk their lives and freedom, and greater safety and comfort. Hunters' bows protect the tame herds from wolves, and smudge fires drive off mosquito swarms. The usual necessities—lodging and food—don't count, for reindeer won't stay in barns. They insist on their natural diet, the arctic mosses, and must be allowed to roam freely to find their own food.

In becoming dependent on this migratory animal so strictly adapted to the seasonal requirements of the far northland, the Siberian people have put themselves too under the control of their harsh environment.

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